CHAPTER 2

BRIEF REVIEW OF RESEARCH WORK ON BASKET BALL
2.1 A BRIEF REVIEW OF THE RESEARCH WORK CARRIED-OUT ON BASKETBALL SHOOTING

Several studies have been conducted with a view to establish a clear basis for achieving accuracy in basketball shooting. These studies deal with the nature of practice in which either the style or the target is varied. Much attention has been paid in achieving shooting ability while practicing, keeping the aim at the rim or the backboard. These studies are briefly reviewed in this chapter. The methodologies followed and the results reported are detailed critically in order to build up a background for the present study.

Scanlon\textsuperscript{6} conducted an experiment to determine the results of focussing attention on a point of reference in basketball field goal shooting. The experiment was administered upon 15 skilled varsity basketball players under dark conditions with only designated target area visible for focussing. Analysis of the data revealed that focussing attention on the entire target (basketball ring covered with luminious point) was superior to focussing attention on either the front or back of the ring. It was also concluded that focussing attention on the back of the ring was superior to focussing attention on the front of the ring.

A study of the basketball field goal attempts in certain high school games was made by Reid\textsuperscript{7} with a view to determine the relative accuracy of different kinds from various areas and distances from the goal. He observed that aiming at the front area of the rim results in successful shots in comparison with aiming at the backboard.
Jable conducted a study on the relative effect of training the players with basketballs of varying weights upon free throw shooting accuracy. Basketballs of three different weights 16 ounces, 40 ounces, and the standard 21 ounces were given to different groups. It was found that practicing with 16 ounces and standard 21 ounces basketballs improved free throw accuracy whereas practice with 40 ounces did not effect free throw shooting accuracy. Visual areas are extremely important in basketball, and the basketball player relies on many of them during a game. Both specific vision (directly concentrating on the rim) and peripheral vision (absorbing the visual field surrounding the action) are important.

Singer quoted in his book "Coaching Athletes and Psychology" about the test conducted by Skills and Troutman on the college basketball players for visual activity, depth perception and peripheral vision to determine the effect of these factors on shooting ability. The subjects took 100 shots at the basket under each of the five conditions mentioned below.

1. Sighting directly on the rim
2. Sighting on the object 10" from the centre of the basket
3. Sighting on the object 20" from the centre of the basket
4. Sighting on the object 30" from the centre of the basket
5. Blindfolded.

Differences in the performances' output were noticed in all the possible mean score comparisons in (1) normal sighting and sighting 10" from the basket, (2) sighting 20" and 30" from the basket and (3) sighting 30" from the basket and shooting blindfolded.
Evidently, a player shooting from a stationary position can shoot as effectively when sighting directly on the rim as when sighting on an object 10" from the centre of the basket. At the higher level of skill, concentrating on the rim may be less important than believed. Coaches feel players shoot most accurately when they concentrate solely on the rim of the basket whereas others believe that cues are needed to allow the player to have a better association with the basket.

Singer quoted in his book "Coaching Athletes and Psychology" about the test conducted by William Guvin at Eastern Illinois University. Guvin recorded data on 20 varsity players taking a number of shots from varying positions under light and dark conditions. Under dark conditions only the rim of the basket was visible. It was concluded that the shooting by the players was more accurate under light conditions.

Fisher conducted a research on the effect of backboard and rim alteration on basketball shooting accuracy. Eight high school subjects were placed in four matched groups based on the 80 attempted shot pretest score. Each group was assigned to one of the 4 practice combinations developed by combining 2 rim sizes (18 inches and 14 inches) with and without backboard. After 15 days of practice an 80 shot post-test was administered on a regular basket. Analysis of variance revealed the performance of the players with any of the practice conditions being superior to the other. Kouri conducted experiments on the comparison of using backboard versus the basket rim as a point of aim in basketball shooting. Ten
male students from the South Dakota State University Junior Varsity Basketball team took 80 shots from selected spots at distance of 10 ft to 15 ft from the basket. The shots were recorded either as shots made or shots missed. Results indicated that at a distance of 15 ft, it is better to aim at the rim to obtain a successful shot.

Lilly\textsuperscript{13} conducted a study to determine the most effective method of shooting basketball short shots: Banking versus Straight In. 2400 attempts were made with each type of shot involving 24 Senior High School Basketball team members as shooters. Shots were taken from five stations located on a 5 ft radius from the centre of the goals. Experiment indicated banking was significantly the superior method of shooting short shots, 20° and 55° angle bank shots were successful at a higher percentage of the time than the 90° angle shot. When directly shot at the basket the angle made little difference.

Willard\textsuperscript{14} conducted a study to compare the bank and aim shots and various combinations from selected shooting angles for the college students. The results have not been analysed in detail. A study on the comparison of various levels of ability and practice conditions when shooting basketballs from three different distances with and without use of backboards was carried out by Roberts\textsuperscript{15}. 36 male subjects from Temple University (USA) were taken and each subject was engaged in a practice session 5 times per week for 4 weeks. Experience was taken as the criterion by Roberts to place the subjects in a specific category. Each subject attempted 15 shots from each of the three designated distances. A total of 45 shots a day were recorded for each subject. Pre and post tests were given to each
individual involved in the study. The test consisted of 10 attempts from each of the three distances under both backboard and no-backboard conditions. Sixty shots were attempted during the test. The factors namely level of experience, distance from where the shot was taken and whether the backboard was used or not were found to play a major role in obtaining a successful shot.

West in his book "How to shoot jump shot" pointed out that when one shoots, he has to aim for the front rim of the basket and not the backboard. When the ball is shot lightly and gently and if the angle is not correct, it misses the basket. But, it may bounce and if it bounces gently on the rim then there are possibilities of its falling into the ring. This is a soft touch which includes a gentle release of the ball with a slight spin and complete follow through with a smooth rhythmic action. The back spin plus the forward momentum of the ball counteracts each other and causes the ball to remain in and around the basket area as it bounces on the rim.

Mortimer studied on shooting and found that as the ball was released at an angle of 58° with the horizontal more shooting percentages were attainable. More power is necessary to project the ball through a high arch. The amount of arch for each individual was found to vary with the strength of the individual.

Kouri points out that at a distance of 10 ft it is better to aim at the backboard rather than at the rim. Most penetration shots are released close to the basket, sometimes from a position under the ring. Since the extended arm position is a weak one, the
force necessary to reach the ring needs to be obtained either from a strong leg drive or from a sweeping action of the extended arm. During the penetration shot, without heavy spin, the point of contact is more restricted generally to positions higher than the ring.

Maaske\textsuperscript{19} conducted a study of basketball shooting on 26 boys. The subjects were divided into two groups consisting of 13 subjects each. One group practiced shooting in a standard official basket. At the end, he concluded that practice of shooting in small baskets improved accuracy in shooting at an official basket.

Martin\textsuperscript{20} conducted a study on the shooting accuracy of Third Grade Students who practiced shooting at goals of height less than 10 ft. The problem was to compare shooting accuracy of Third Grade Students who practiced at a graduated basket of height 8 to 10 ft with shooting accuracy of those who practices at a regular basket of 10 ft high. One experimental group began practice at a basket 8 ft high. The basket was gradually raised in 6 inches increments to 10 ft over a 6 week period. The second group practiced at 10 ft high basket during the entire practice period.

Tests were conducted to see if there was a significant difference between the results of the initial and the final tests which were conducted at 10 ft height, and if there was a significant difference in shooting accuracy between the groups on the final tests. All groups showed improvement. The boys who practiced at the regular basket received greater shooting accuracy than those who practiced at the graduated height basket.
2.2. AIM AND SCOPE OF THE PRESENT INVESTIGATION

The main objective in basketball play is to shoot the ball through the allotted basket. As victory of the team depends upon the number of the baskets scored by any team, shooting the ball into the basket plays a predominant role in the basketball play. Therefore shooting a basket becomes the main objective of a basketball player. A good technique is one which produces successful shots. The combination of speed and angle of release which most likely results in a successful shot, depends upon the ring aim or board aim and the position of the player. Hence shooting is obviously the chief factor in this game of basketball. According to the distance there are three types of shots apart from the free throw shot. They are short shot, medium shot and long shot.

Short shot: A short shot is a shot taken within a radius of 3.66 m from the basket.

Medium shot: A medium shot is a shot taken between a radius of 3.66 m and a radius of 7.32 m from the basket.

Long shot: A long shot is a shot taken outside a radius of 7.32 m from the basket.

It is observed that the best shots are those in which the player concentrates on getting the clean shot through the basket. Most of the players aim the ring from the angle of 0° to 15° and 45° to 90°. From the angle of 15° to 45° on both sides of the boards, the players use the board aim. All the attempts of shooting from short shot area are made aiming at the ring. The medium and long shots are aimed directly at the basket and not at the board.
There are three types of basketball shooting arches directed towards the basket which are shown in the figure 2.2.1. 'A' requires the greatest accuracy but the least amount of strength. 'B' must be high enough to clear the guards' hands. 'C' shows the high arc which requires the greater amount of strength but the least accuracy. In each case the ball traces a parabola. The amount of arch to be put on the ball is a problem of accuracy, strength and defence. When a player is absolute, then the amount of arch would be that necessary to clear the upraised hand of the opponent and the near edge of the rim of the basket. When the opponent is close to the shooter, more arch is necessary than that required if the opponent is a bit further away from the shooter. The diameter of the basket 0.45 m. When the ball is dropped from directly above the centre of the basket, the full area and the diameter of the basket is projected at a right angle to the line of flight of the ball. When the ball is put at an angle of 60° with the plane of the rim, only 0.8661 of the diameter is projected at a right angle to the line of the flight. When the ball is put at an angle of 45° then 0.7071 is available as a target. When the ball is put at 30° the margin is reduced to 0.5. This ratio is actually the sine of the angle which the line of flight of the ball makes with the horizontal plane of the basket, multiplied by 0.45 m, that is, the diameter of the basket. Thus, as the angle is reduced, it becomes evident that the chances of the ball hitting either the front or back edge of the rim and bouncing away from the basket increase proportionately. Therefore, the lower the angle of flight of the ball, the greater must be the accuracy of direction. All the shots that are in
Fig. 2.2.1 - Different types of basketball shooting archs.
practice in the basketball game are dynamic except the free throw shot. The free throw shot will be taken in the free throw marked area in the static position. The dynamic shots are 1. Set shot, 2. Jump shot, 3. Layout shot, 4. Hook shot and 5. Dunking shot. In all these shots, the player aims either at the ring or the backboard and the success of the shot mainly depends on the angle of release of the ball. Any player who attempts a dynamic shot is sure to capitalise it if only he overcomes the offender's attempts to nullify the efforts. In the case of free throw shot, there is no opponent force acting on the shooter and the ability of the shooter alone matters in the successful attempt. In the basketball play free throws are awarded as a result of personal foul committed by the opposite team players. These free throws are of significant number and conversion of these free throws into cent percent successful ones is a moral boost to the team. Hence all the players should gain efficiency in converting the free throw into a successful shot. The number of free throws awarded to a team reflects the aggressive style of play of the team and their tactical efficiency to compel the defending team to commit more fouls which result in the award of free throws. The average conversion rate of these throws should be higher than that of other type of shots. This is because the free throw is executed under standard static conditions and there is no interference of the opponent in its execution.

The present study is conducted to the analysis and understanding of the controlling factors in free throw shooting. The free throw is schematically shown in Fig. 2.2.2. The two factors that are of important in free throw are (1) angle of release and (2) aim. The
Fig 2.2.2 - Flight of the ball on a free throw.
angle of release depends on the aim that is the rim of the ring or backboard apart from the height of the player. Literature survey indicates that the angle of release plays a predominant role in achieving a successful free throw shot. The best launching angle can be fixed depending on the height of the player keeping the aim as the centre of the ring. But practice is the most important factor and the technique differs from player to player and in such cases the best launching angle comes out or practically turns out to be different from the theoretically estimated one. The aim of the investigator in the present study is to examine the best launching angle for different types of players where the variables are (1) the height of the player and (2) the experience of the player.

An experimental technique is designed to fix the angle of release of the ball which is detailed in the next chapter. The physics involved in the basketball play is also detailed in the next chapter.